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Conference Abstract

Tools and Skills for the Curation of Digitised Herbaria

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Abstract

As the digitisation of natural science collections progresses, the need for tools and skills for the staff who curate those collections becomes increasingly important and urgent. The specimens held in these collections are fundamental to research and are a critical source of data and knowledge urgently needed for the current biodiversity crisis. Without taxonomic curation, the names attached to these specimens may be synonyms, misapplied or incomplete. One study examined specimens from 40 herbaria in 21 countries and found that half of specimens from two tropical plant families had the wrong names applied (Goodwin et al. 2015). These issues may have a significant impact on research undertaken based on these collections.

Curation of natural science collections covers a huge range of activities and responsibilities. Taxonomic curation is the management and updating of the taxon names applied to the specimens in collections. Taxonomic curation can be carried out at different levels. A key aspect of taxonomic curation is providing access to accepted classifications across multiple taxonomic levels and enabling comparisons with alternative systems, including those already in use within a collection. At the specimen level, tools to access specimen citations, identifications of duplicates as well as managing online determinations are becoming more important for curation staff and volunteers. These processes require digital skills for curators. For curation staff and volunteers to develop

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similar skills and be trained in the use of technical tools, adequate and accessible training documentation is required.

Before digitisation, collections were frequently curated using regional taxonomic accounts and it was quite common to have specimens from different regions arranged differently, resulting in multiple taxonomies through the collection. With digitisation, there is usually a single taxonomy in the database which pushes us more towards aligning all specimens to a single classification. The digitised specimen record will normally include the name under which the specimen is physically filed, and it is critical that this is always aligned to ensure findability of the specimen. This is a huge task and the combination of the growth of the collections and the lack of growth in staffing levels means that we must look at more efficient options for doing this work.

Case studies in the Herbarium of the Royal Botanic Garden Edinburgh were undertaken to review the process of curation of several digitised taxa and one undigitised taxon. This allowed us to explore the impact of digitisation on curation practices. We also investigated the additional training requirements for staff to be able to use the increasing number of online tools and resources available. The case studies included the genera *Plectranthus* and *Coleus* in the Lamiaceae (Fig. 2, *Streptocarpus* in the Gesneriaceae (Fig. 1) and the family Lycopodiaceae.

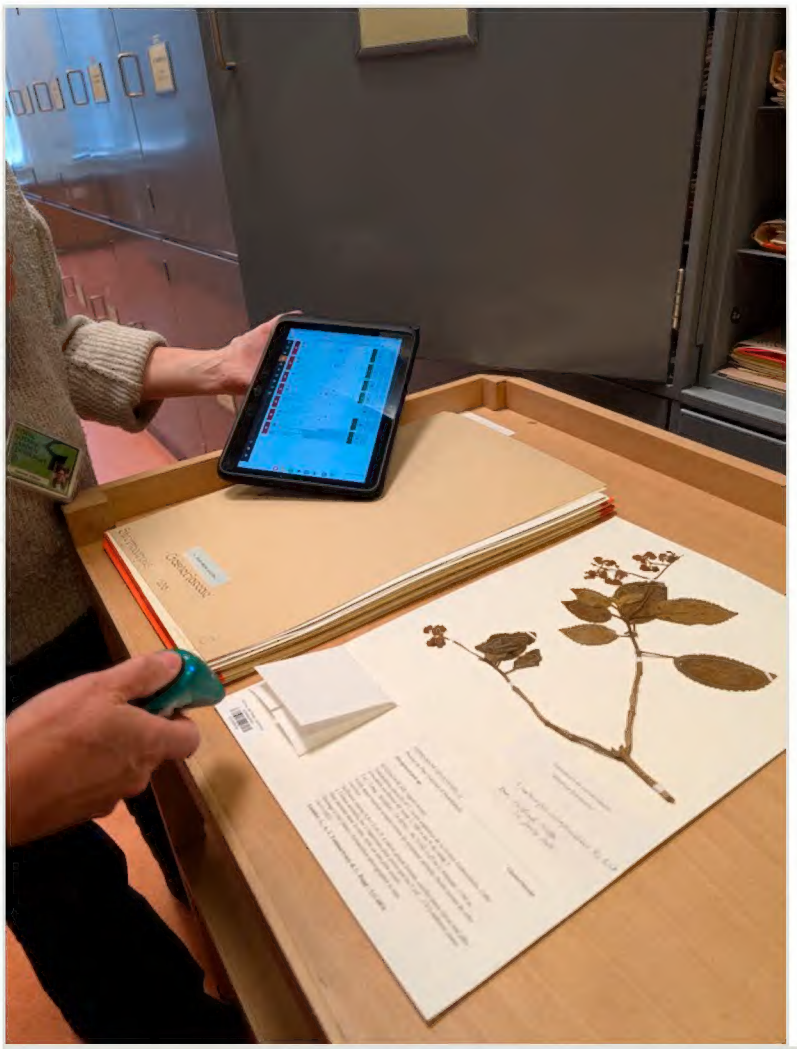

Figure 1.

Checking the name under which a specimen is filed, reading in the specimen barcode to query the collection management system (CMS). Photo by EM Haston (CC-BY 4.0).

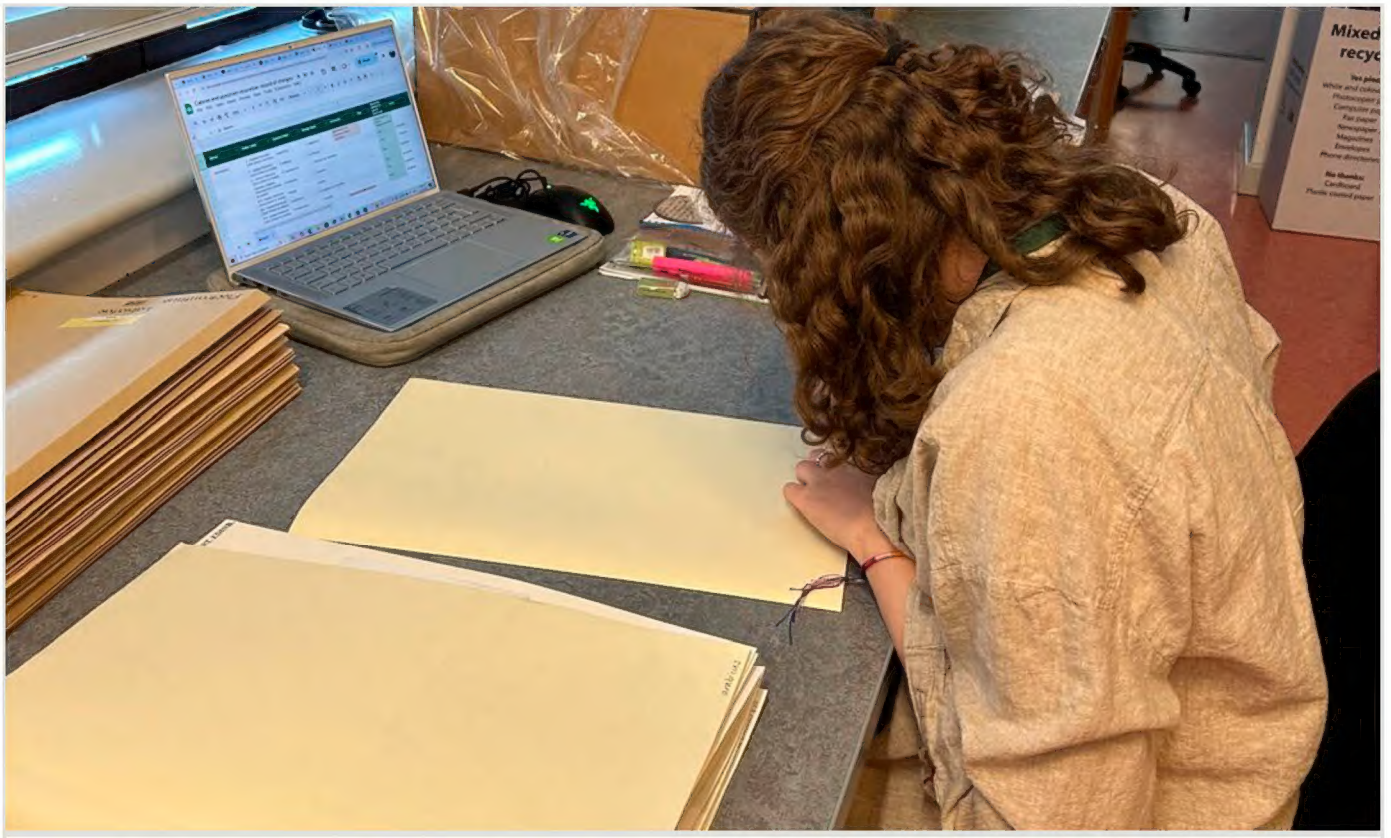

Figure 2.

Updating the folders during the taxonomic curation of *Plectranthus* and *Coleus* in the Lamiaceae. Photo by HKCK Ng (CC-BY 4.0).

We identified 4 levels of curation:

1. High level to delimit and organise the collection at Kingdom, Phylum and Class level;
2. Family level to delimit and organise families and the genera within them;
3. Genera and species level to delimit and organise genera and species; and
4. Specimen level to identify individual specimens in the collection. The appropriate level of taxonomic curation will depend on the scope of the taxa being curated and the time and resources available.

Using the case studies at the Royal Botanic Garden Edinburgh, we are developing more effective and efficient taxonomic curation workflows for digitised collections. For each workflow, we include the tools and resources available as well as consider the skills, knowledge, and training required. The initial workflow for the genera and species level comprises ten steps:

1. Curation requirements and prioritisation;
2. Classification review;
3. Taxonomic scope;
4. Review and comparison of taxonomy in literature;
5. Review and comparison of taxonomy in the collection management system (CMS);
6. Recuration planning and communication across the organisation;
7. Updating of names and taxonomy in the CMS;

8. Reorganisation and updating of specimens and folders (Fig. 2) and specimen records in the CMS;
9. Updating of indexes; and
10. Updating of cabinet labels.

The development of workflows has identified requirements for tools and resources, as well as requirements for skills. This approach can also standardise taxonomic curation practices and make it easier to train curation staff, giving them guidance for their work.

Keywords

taxonomic curation, digitisation

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Conflicts of interest

The authors have declared that no competing interests exist.

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